

INNOVATIVE COKE OVEN GAS CLEANING SYSTEM
FOR
RETROFIT APPLICATIONS
QUARTERLY TECHNICAL PROGRESS REPORT NO. 4
FOR THE PERIOD COVERING
OCTOBER 1, 1990 TO DECEMBER 31, 1990

PARTICIPANT

Bethlehem Steel Corporation

Bethlehem, PA

M. R. Mazer* - Program Director

Prepared for the United States Department of Energy
Under Cooperative Agreement No. DE-FC22-90PC89658

Patents Cleared by Chicago on March 28, 1991

- * Assembled from file documents by D. Kwasnoski, Current Program Director on October 22, 1993.

BACKGROUND

Refer to Quarterly Technical Progress Report No. 1, May 24, 1989 to March 31, 1990.

TECHNOLOGY DESCRIPTION

There has been no change since Quarterly Technical Progress Report No. 1.

PROJECT DESCRIPTION

There has been no change since Quarterly Technical Progress Report No. 1.

PROCESS DESCRIPTION

There has been no change since Quarterly Technical Progress Report No. 1.

SUMMARY

Work on this coke oven gas cleaning demonstration project (CCT-II) this quarter has been focused on Phase IIB tasks, and include engineering, procurement, construction, and training. Additionally, plans for changes in the operating schedule of the coke plant that affect the demonstration project are described. The project Milestone Schedules and Logs for Phases I, IIA, and IIB are shown in Figures 1, 2, and 3, respectively.

Engineering efforts performed by Davy/Still-Otto are nearly complete. Remaining to be finalized is an assessment of electrical heat tracing/insulation needs for pipe lines, assessment of fire protection requirements, and instrument modifications.

Procurement of all major equipment items is complete, except for possible additions to fire fighting capabilities. Major focus is on expediting pipe and structural steel to the project site.

Civil construction is complete except for minor pads and bases as required for pipe supports, etc. Erection of the hydrogen sulfide and ammonia scrubber vessels is complete. Installation of scrubber vessel internals is underway.

A subcontractor has been retained to develop a computerized program for operations and maintenance training for the coke oven gas treatment plant.

Recent developments in the coke plant operating plans will result in reductions in the rate of production of coke oven gas to be processed in the demonstration project.

Engineering Status

Engineering is nearly complete. See Figure 4. Focus is currently on establishment of a detailed check-out and start-up program. Civil engineering is complete except for a fire fighting pumphouse, which is outside the CCT-II project, per se. Structural

engineering is also complete. Field dimensional checks for routing the 42-inch gas main are being made to release final dimensions on support trestles, to allow completion of fabrication. Electrical engineering is almost complete, with a delay having resulted from electrical and instrumentation scope changes. Bid packages for installation of electrical and instrument systems have been issued. Bids are due from potential subcontractors in January 1991. Instrument engineering is nearly complete. All long lead items have been purchased. Piping and instrumentation drawings, installation detail sheets, etc., have been issued for construction. Bid packages for heat tracing and insulation are being prepared.

Procurement Status

Purchasing effort is now in a "clean up" mode, e.g., acquiring small items for instruments. One hundred twenty-three purchase orders have been placed and one hundred five inquiries have been issued. See Figure 5.

Construction Status

1. **Wet Surface Air Coolers:**
Installation of equipment and piping is 90% complete.
2. **Ammonia and Hydrogen Sulfide Scrubbers:**
Installation of trays and packing in the scrubbers is well underway. The 54-inch gas main headers and connections to the scrubbers are 75% complete.
3. **Ammonia Stills and Deacidifiers:**
Two of the three ammonia stills and one of the two deacidifiers are erected. Structural steel is 75% complete. Late delivery of deck grating is restraining installation of piping.
4. **Ammonia Destruction and Sulfur Recovery Plants:**
Erection work will commence following delivery of the catalytic reactor and reactor vessels. Delivery is anticipated mid-January 1991.
5. **Pipe Work:**
Erection of interconnecting pipe work is restrained due to late delivery of structural steel columns, promised for delivery mid-January 1991.

Training Status

RWD Technologies, Inc. has been issued a contract to develop an interactive computerized training system. Working with Davy/Still-Otto and Bethlehem Steel Corporation's Sparrows Point plant personnel, the interactive system will facilitate training of the plant operators for system start-up, steady-state operation, and maintenance.

Coke Plant Production Plans

Changes are to occur in the plans for operating the Sparrows Point Coke Plant. As a result, the total production of coke oven gas is expected to be reduced to about 42 million cubic feet per day by August 1991. This coincides with the target date for hot start of the coke oven gas cleaning demonstration project. The design capability of the coke oven gas cleaning system is 74 million cubic feet per day. Bethlehem will initiate efforts to define means to provide data of maximal generic value during the operations phase (PHase III) of the CCT-II project.

Schedule Status

Emphasis remains on the construction schedule. Status is as follows:

<u>Engineering</u>	<u>Material Ordered</u>	<u>Material Delivered</u>	<u>Construction</u>
90%	99%	70%	29%

The construction schedule is being critically reviewed and updated by Davy/Still-Otto, Comstock (construction manager), and the construction contractors. Structural supports, piping, and other ancillaries were not satisfactorily addressed in the original detailed design drawings. As a result, some slippage in the erection schedule is anticipated, but the construction completion date of October 31, 1991 required by our Administrative Consent Order issued by the State of Maryland is still attainable.

Financial Status

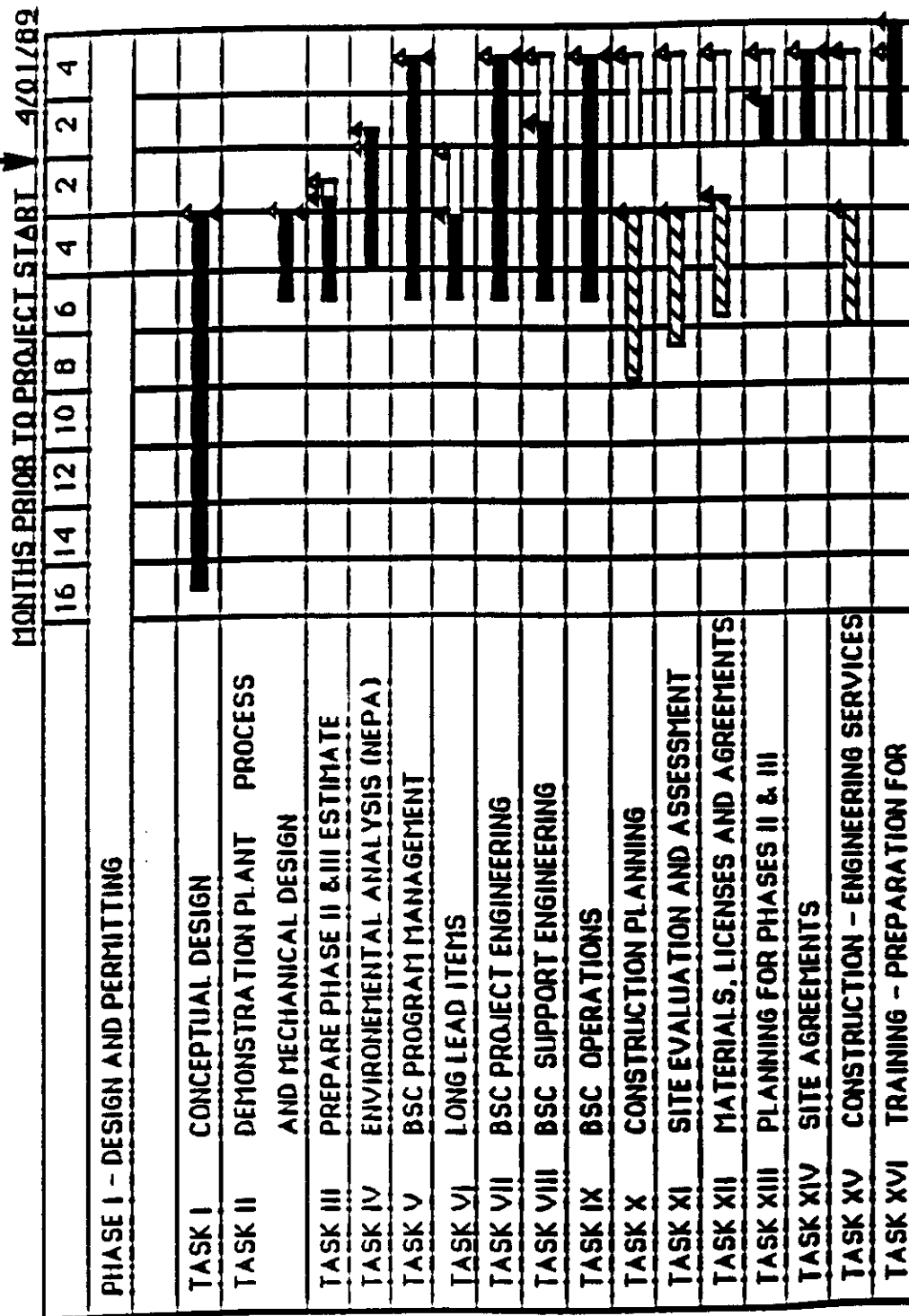
Figures 6 and 7 portray actual project costs incurred to date and anticipated project spending. Actual expenditures through December 1990 are about as originally planned. However, current indications are that the original plans for piping, structural supports, etc., were inadequate, and costs were underestimated. The magnitude of the resultant project cost growth has yet to be determined.

PLANS FOR NEXT QUARTER

Conduct a re-estimation of costs and installation schedule for this CCT-II demonstration project, award the electrical and instrumentation subcontract, and submit the Preliminary Public Design Report for review and comment.

BETHLEHEM STEEL CORP / DOE CLEAN COAL PROJECT SPARBROWS POINT, MD.

Figure 1
1 of 2



- ▲ - ORIGINAL MILESTONE-COMPLETION
- ▲ - TASK COMPLETED (MAJOR OR INTERMEDIATE TASK)
- * - REVISED TASK COMPLETION DATE (1ST, 2ND, NTH REVISION)

file: DOE_PHASE I
 10/16/89
 REV. 04/03/90

Figure 1
2 of 2

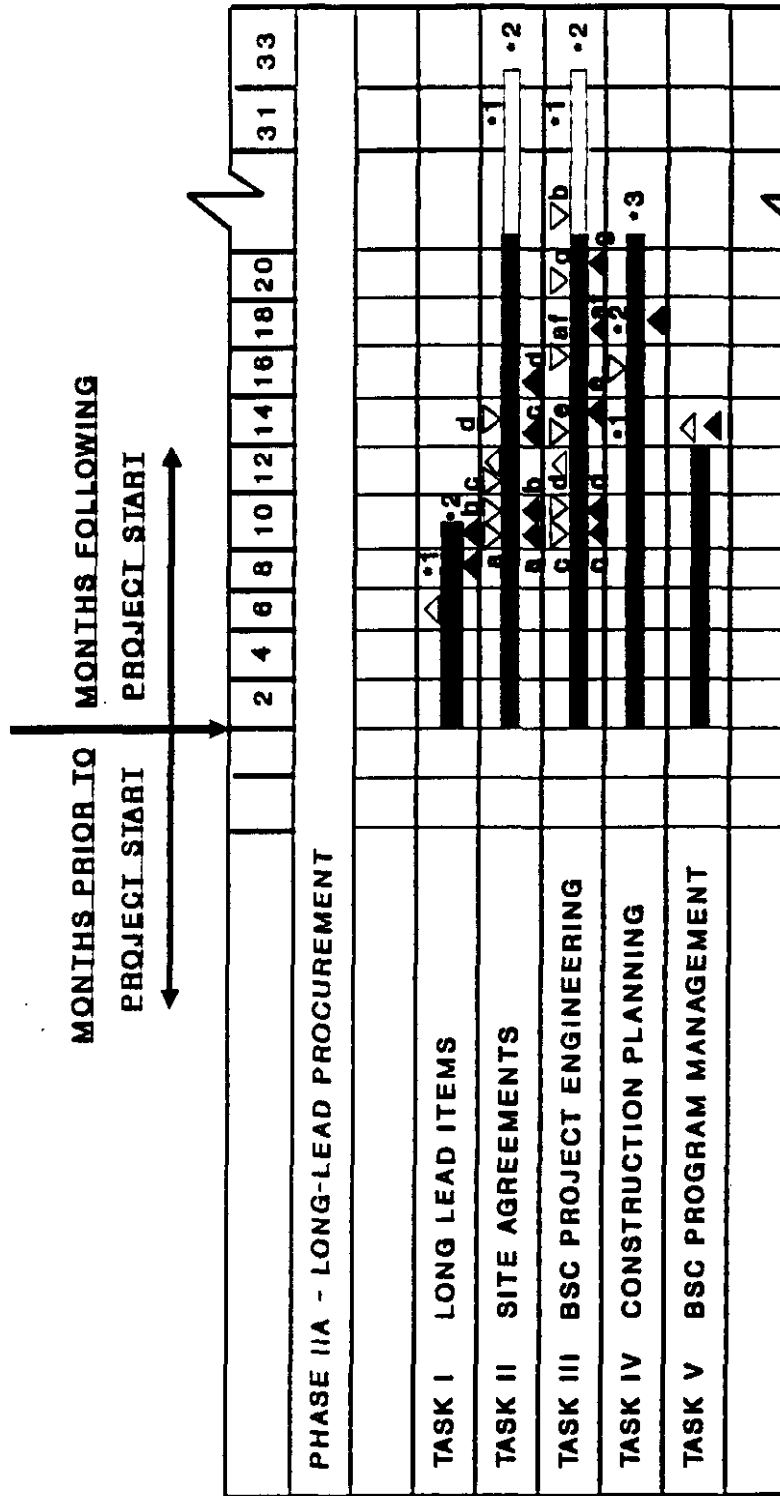
Milestone Log for Phase I Tasks

<u>Task No.</u>	<u>Description</u>	<u>Planned Completion Date</u>	<u>Actual Completion Date</u>	<u>Comments</u>
1	Conceptual Design	1/20/89	1/20/89	Final DSO Report
2	Process & Mechanical Design	1/20/89	1/20/89	Final DSO Report
3	Prepare Phase II & III Est.	3/01/89	2/17/89	FAR Submission
4	NEPA	4/01/89	4/30/89	ERM Report
5	BSC Program Management	6/30/89	6/30/89	-
6	Long Lead Items	4/01/89	1/23/89	1st DSO Schedule
7	BSC Project Engineering	6/30/89	6/30/89	-
8	BSC Support Engineering	6/30/89	4/30/89	Environmental Support
9	BSC Operations	6/30/89	6/30/89	-
10	Construction Planning	6/30/89	1/20/89	Final DSO Report
11	Site Evaluation	6/30/89	1/20/89	Final DSO Report
12	Materials, Licenses	6/30/89	1/20/89	Final DSO Report
13	Planning for II & III	6/30/89	5/31/89	DSO Contract Date
14	Site Agreements	6/30/89	6/30/89	Submit Permit Request
15	Construction - Eng. Serv.	6/30/89	1/20/89	DSO Final Report
16	Training	6/30/89	7/30/89	First Submission by DSO

Figure 2
1 of 2

BETHLEHEM STEEL CORP/DOE
CLEAN COAL PROJECT
SPARROWS POINT, MD
PHASE IIA SCHEDULE

PROJECT START
4/01/89



- △ - ORIGINAL MILESTONE / COMPLETION DATE
- ▲ - TASK COMPLETED (MAJOR OR INTERMEDIATE TASKS)
- - REVISED TASK COMPLETION DATE (1ST, 2ND, NTH REVISION)
1, 2, ... N
- ▽ - INTERMEDIATE EVENTS - SEE MILESTONE LOG

Figure 2
2 of 2

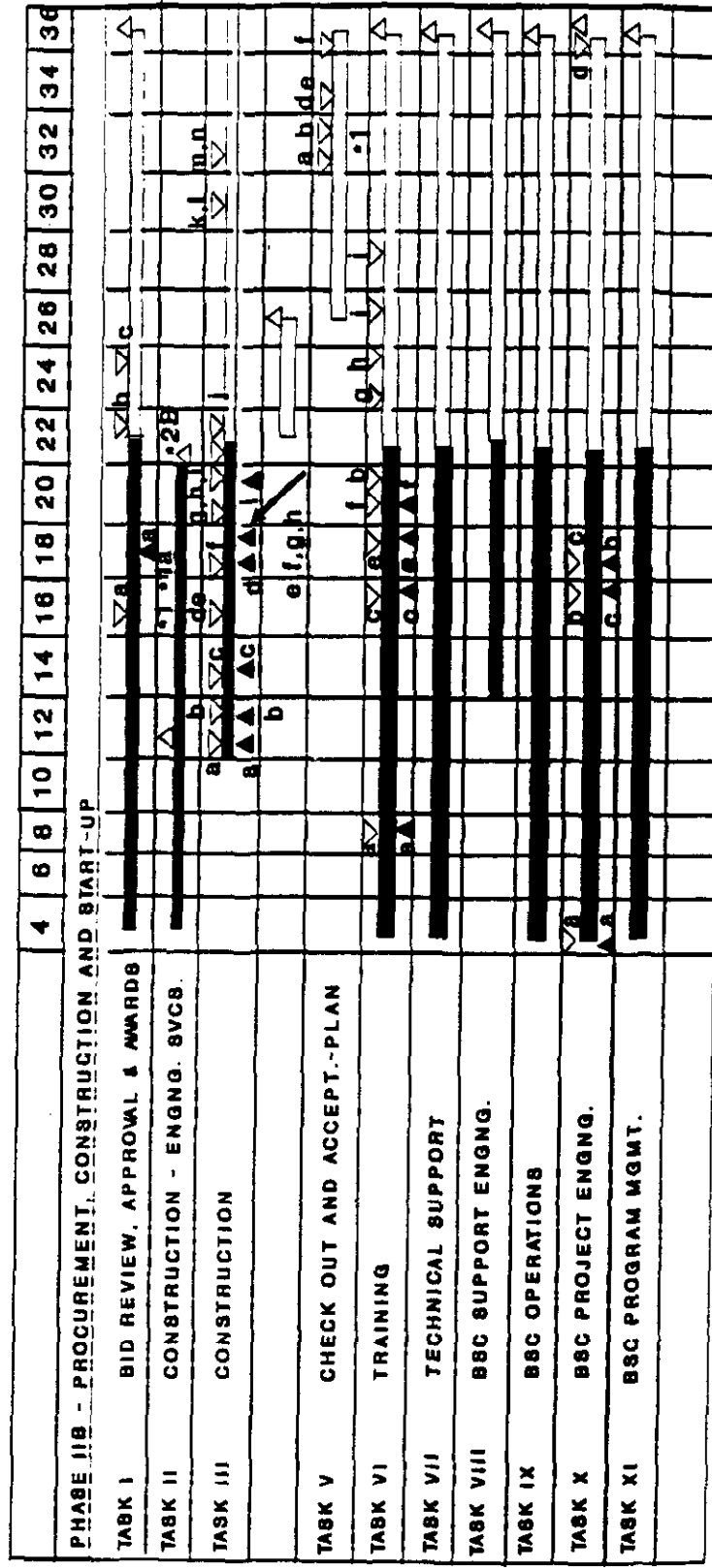
MILESTONE LOG FOR PHASE IIA TASKS

<u>Task</u>	<u>Description</u>	<u>Original Completion Date</u>	<u>Intermediate Events</u>	<u>Revised Completion Date</u>	<u>Actual Completion Date</u>	<u>Comments</u>
1.	Long Lead Items *1	08/31/89		11/30/89	11/30/89	All 6 month delivery orders except electrical substation items placed.
	*2			12/15/89	12/08/89	Electrical substation order placed.
2.	Site Agreements *1	03/31/90		10/10/91		End date changed to reflect anticipated date of system acceptance.
	*2			12/31/91		End date changed to reflect anticipated date of system acceptance.
			a. 12/15/89		12/13/89	Date of Inquiry - piling contract
			b. 01/12/90		01/19/90	Date of Inquiry - foundation contract
			c. 02/28/90	04/06/90	04/04/90	Date of Inquiry - general construction contract
			d. 05/04/90		06/01/90	Date of Inquiry - electrical/control contract
3.	BSC Project Engineering *1	03/31/90		10/10/91		End date changed to reflect anticipated date of system acceptance.
	*2			12/31/91		End date changed to reflect anticipated date of system acceptance.
			a. 07/30/90		08/27/90	Place general construction contract.
			b. 2/28/91			Place construction contract including electrics.
			c. 12/15/89		12/08/89	Complete long lead item review.
			d. 01/15/90		01/19/90	Place Contract - piling contractor
			e. 03/16/90	4/20/90	05/02/90	Place Contract - foundation contractor
			f. 06/01/90	07/30/90	08/27/90	Place Contract - general construction
			g. 07/16/90	10/31/90	10/26/90	Place Contract - electrical/control
4.	Construction Planning *1	03/31/90		08/31/90		End date changed to reflect all major equipment on site
	*2			10/31/90		
	*3		06/10/90	7/30/90	09/10/90	General construction contractor on site
5.	Program Management	03/31/90				Will continue to meet reporting deadlines.

Figure 3
1 of 3

BETHLEHEM STEEL CORP/DOE
CLEAN COAL PROJECT
SPARROWS POINT, MD
PHASE IIB SCHEDULE

MONTHS AFTER PROJECT START 04/01/89



MILESTONE LOG FOR PHASE IIB TASKS

<u>Task</u>	<u>Description</u>	<u>Original Completion Date</u>	<u>Intermediate Events</u>	<u>Revised Completion Date</u>	<u>Actual Completion Date</u>	<u>Comments</u>
1.	Bid Review, Approval and Awards	02/28/92	a. 06/01/90 b. 08/31/90 c. 10/31/90	7/30/90 01/31/91 03/31/91	08/27/90	Place general construction contract. All major equipment on site. Final invoicing for equipment (except for retention.)
2.	Construction Engineering	03/31/90				
	*1			06/15/90		Place construction contract.
	*1a			07/30/90	08/27/90	
	*2			07/16/90		Place Electrical/Control contract.
	*2a			08/15/90		
	*2b			11/30/90	10/26/90	
3.	Construction	02/28/92	a. 02/01/90 b. 03/30/90 c. 04/02/90 d. 06/01/90 e. 06/10/90 f. 07/02/90 g. 07/16/90 h. 09/01/90 i. 09/04/90 j. 09/04/90 k. 01/21/91 l. 04/05/92 m. 04/24/91 n. 05/01/91	04/30/90 07/30/90 08/01/90 10/31/90 11/30/90 11/01/90 02/01/91 08/30/91 08/30/91 10/31/91 10/31/91	02/12/90 03/19/90 05/21/90 08/27/90 09/10/90 09/19/90 10/26/90 11/30/90 11/01/90	Start pile driving. Complete pile driving. Begin foundation construction. Place general construction contract. General contractor on site. Begin erection of vessels and structural steel. Place electrical/control contract. End foundation construction. Begin piping installation. Begin electrical installation. End erection of vessels and structural steel. End piping installation. End electrical installation. End general construction
4.	Check Out and Acceptance Plan	05/01/91				

<u>Task</u>	<u>Description</u>	<u>Original Completion Date</u>	<u>Intermediate Events</u>	<u>Revised Completion Date</u>	<u>Actual Completion Date</u>	<u>Comments</u>
5.	Check Out and Acceptance - Execute	10/31/91				
	*1		a. 05/01/91 b. 07/01/91 c. 07/02/91 d. 08/02/91 e. 08/02/91 f. 12/10/91	12/31/91 10/01/91 10/31/91 11/01/91 12/31/91 12/31/91 02/28/92		Meet compliance. Begin cold commission. End cold commission. Begin hot commission. End hot commission. Begin punch list. End punch list.
6.	Training	09/30/92	a. 11/30/89 b. 06/01/90 c. 07/01/90 d. 06/01/91 e. 09/09/90 f. 10/05/90 g. 02/01/91 h. 03/01/91 i. 04/01/91 j. 08/01/91	11/30/90	11/30/89 07/01/90 09/09/90 10/05/90	Draft of training manuals. Complete training manuals. Begin Foxboro Management Overview Training. Complete Foxboro Management Overview Training. Begin Foxboro DCS Maintenance Training. Complete Foxboro DCS Maintenance Training. Begin Foxboro DCS Operator Training. Complete foxboro DCS Operator Training. Begin RWD Interactive Training. Complete RWD Interactive Training.
7.	Technical Support	02/18/92				Ongoing as required.
8.	BSC Support Engineering	02/28/92				Ongoing as required.
9.	BSC Operations	02/28/92	(See Phase III - Task I)			
10.	BSC Project Engineering	02/28/92	a. 04/12/89 b. 05/31/90 c. 06/01/90 d. 12/31/91.	07/16/90 08/16/90 02/28/92	04/12/89 08/15/90 07/15/90	Begin monthly engineering team meetings. End monthly engineering team meetings. Begin construction team meetings. End monthly construction team meetings.
11.	BSC Program Management	02/28/92				Will continue to meet reporting deadlines.

**BETHLEHEM STEEL CORPORATION
SPARROWS POINT
COAL CHEMICAL PROJECT**

ENGINEERING DRAWINGS AND DESIGN STATUS

DISCIPLINE	ESTIMATED # OF DRAWINGS		# OF DRAWINGS COMPLETED		PERCENT COMPLETE		ENGINEERING MILESTONES- 95 % COMPL.
	PREVIOUS	CURRENT	PREVIOUS	CURRENT	PREVIOUS	CURRENT	
1. MECHANICAL & VESSELS	122	122	121	121	99.0%	99.0%	30-Sep-89
2. PIPING	187	187	184	184	98.0%	99.0%	30-Jun-90
3. CIVIL	69	69	68	68	99.0%	99.0%	30-Jun-90
4. STRUCTURAL	58	58	58	58	99.0%	99.0%	30-Mar-90
5. ELECTRICAL	125	126	115	126	95.0%	99.0%	30-Nov-90
6. INSTRUMENTATION	298	298	280	298	95.0%	99.0%	30-Nov-90
TOTAL:	859	860	826	855	96.8%	99.0%	

Figure 5

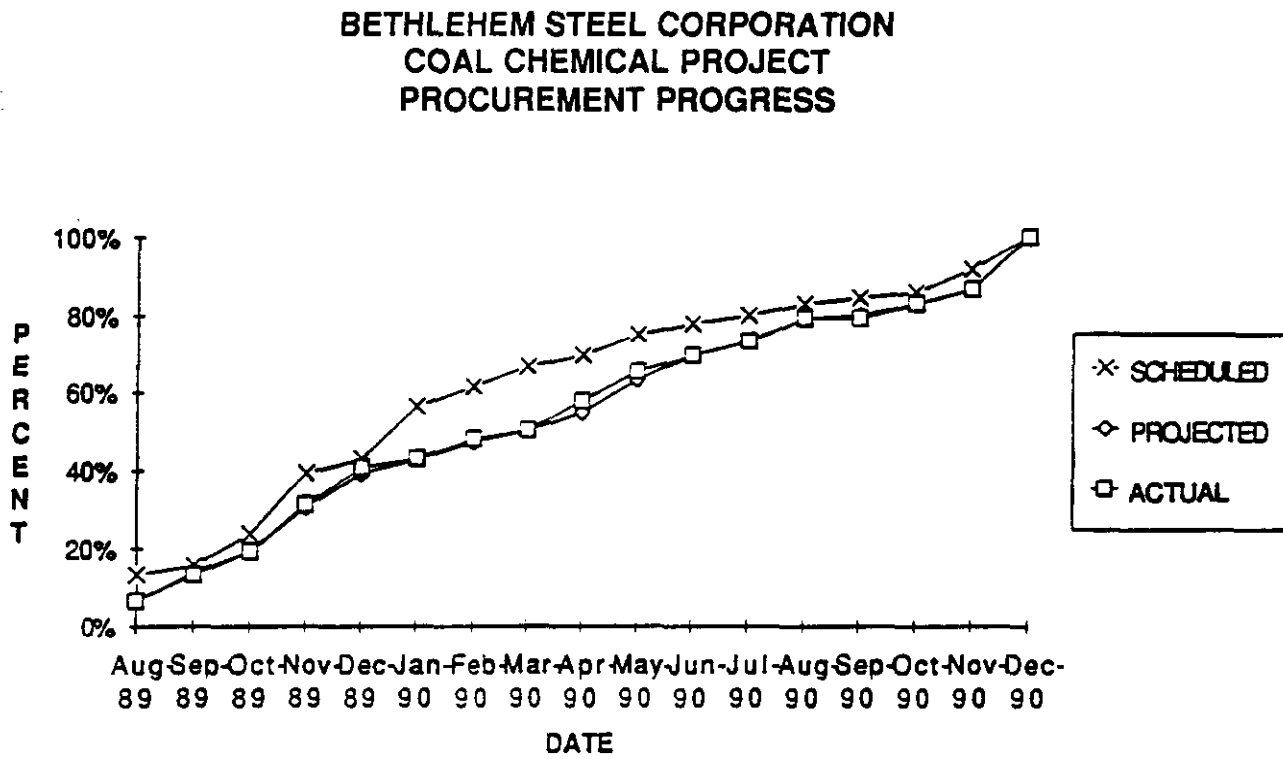
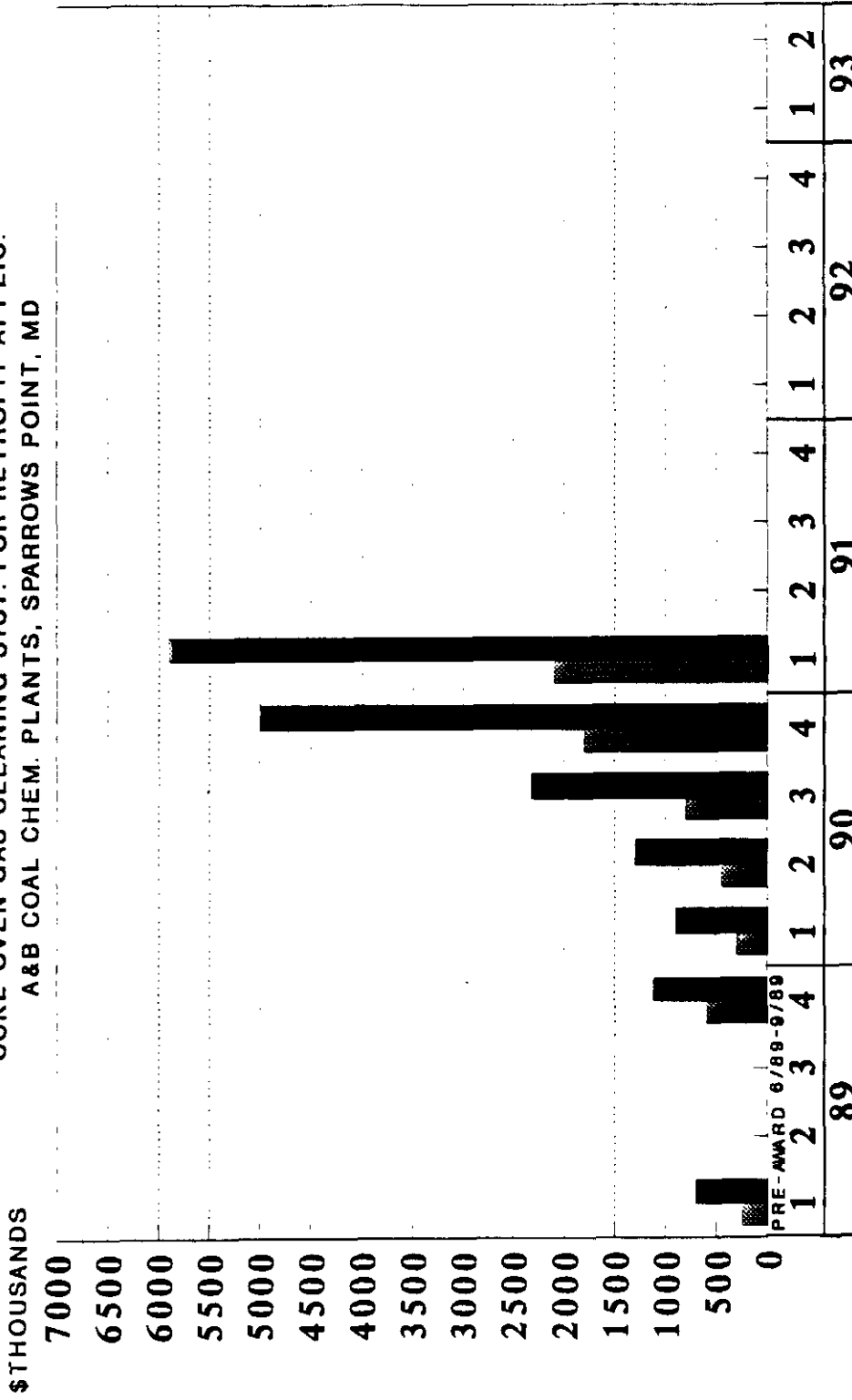


Figure 6

TOTAL PROJECT COST VS. DOE COST SHARE THROUGH 1ST Q 1991

COKE OVEN GAS CLEANING SYST. FOR RETROFIT APPLIC.

A&B COAL CHEM. PLANTS, SPARROWS POINT, MD



■ DOE COST SHARE ■ TOTAL PROJECT COST

**COKE OVEN GAS CLEANING SYST. FOR RETROFIT APPLIC.
A&B COAL CHEM. PLANTS, SPARROWS POINT, MD.**

